

BEREC Report on the IP interconnection ecosystem

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Long history of addressing IP-IC issues

• BEREC IP-IC reports: 2024, 2017, 2012

BEREC works on charging mechanism

 BEREC also contributed to the debate on payments from CAPs to telcos



Comprehensive / evidence-based approach

- 12 stakeholder workshops (Sept. Oct. 2023)
- exhaustive data collection exercise (autumn 2024)
- ad hoc questionnaire to a broad range of stakeholders → for timing reasons not included in the report
- Public consultation (11. June 1. Aug.)
 - 36 responses: civil society, CAPs, CDN providers, cloud and hosting providers, ISPs, IXPs, academics/experts

High-level observations

- Diverging views: ISPs vs CAPs
- Report not replicating debate on payments from large CAPs to ISPs
- ...IP-IC arguments raised by stakeholders often stem from that debate
- Focus often large players on both sides but also of relevance for smaller players



Issues assessed

- Traffic developments
- Pricing / cost developments
- Market developments
- Generic structure of IP-IC issues
- Bargaining situation (CAPs/ISPs)
- Relationship IP-IC / OIR



Traffic developments



- Peak-to-average ratio stable 2019-2023
- Future: increasing diffusion of UHD video / live streaming
- On-net CDNs installed in vast majority of IASs' networks / more efficient compression techniques
- Internet managed to **coped** with traffic growth/peaks
 - Due to competition / technological progress



Pricing / cost developments

- Prices and costs for IP-IC services \rightarrow downward trend continues
- Traffic growing but cost per GB has fallen faster
- Technological development (e.g. on-net CDNs) reason why increase in data traffic has not passed through to prices/costs
- Larger players more successful in reducing costs than smaller players



Market developments (i)

- Large CAPs' **investments** in backbone infrastructure \rightarrow competitive pressure on transit providers
- Traffic via on-net CDNs increasing, most ISP allow on-net CDNs
- IAS providers vertically integrated with Tier 1 providers generally use their own transit services. Then, CAPs typically pay for IC



Market developments (ii)

Substitutability peering / transit

- Quality: peering rather a substitute to transit than vice-versa
- Transit as fall-back option:
 - availability/pricing of transit constraining negotiations over the settlement basis of peering agreements
- Transit less of a substitute to peering if high latency/bandwidth requirements
- Under certain conditions transit can *technically* be provided that it may serve as a substitute



Generic structure of IP-IC issues (i)

- Both sides market sides hold each other responsible for causing congestion
- Generic description: artificial congestion of transit routes
 - Thus: either low quality or (high) fee for premium transit
- Not only conceivable if ALL routes are congested
- Workshops showed: most disputes stem from vertically integrated IAS providers attempting to leverage their termination monopoly to introduce (higher) fees for IP-IC directly from CAPs.



Generic structure of IP-IC issues (ii)

- Evidence from the US:
 - ISPs deliberately let IC interfaces congest
 - ISPs accepted **short-term costs** (more expensive routing) because they expected higher **long-term benefits**
- IP-IC ecosystem is driven by functioning market dynamics / cooperation. But: some disputes since 2017
 - stakeholders: "edge cases" / not calling for regulation



Bargaining situation (CAPs/ISPs) (i)

- Stakeholder with **opposing views**:
 - ISPs: CAPs with must-have content, asymmetric regulation
 - CAPs: ISPs with termination monopoly
- Factors impacting on the relative bargaining situation, e.g. :
 - Degree of substitutability transit/peering
 - Cost structure transit/peering
 - Scales
 - Market/technological developments



Bargaining situation (CAPs/ISPs) (ii)

 Generally, debate largely mostly about large CAPs vs. ISPs - but small CAPs also affected

Switching

- Opposing views on whether end-users switch in case of qualitative issues
- OFCOM/FCC): switching rates rather **low** in practice



Bargaining situation (CAPs/ISPs) (iii)

Number of end-users

- ...important for the relative bargaining power of an IAS provider
- ...impacts the ability to request termination fees
 - FCC explicitly emphasized this
- In general, IP-IC bargaining situation balanced
- Smaller players : typically higher costs thus affecting their bargaining situation



Relationship IP-IC / OIR



 Finding of OIR infringement → case-by-case examination (specifically if circumvention through IP-IC)



Main findings

- Findings consistent with previous IP-IC reports
- IP-IC market driven by **competitive market forces** without regulatory intervention
- ... but few disputes since 2017
- No structural problem in peering / transit markets
- No need for additional regulation the market works
- IP-IC ostensibly out of OIR scope, but indirectly within

